as in gastric or duodenal ulcer, and the giving of acids under such conditions is liable to have a deleterious effect upon the renal function. A high blood urea will correct itself with the restoration of body fluid and chlorides to the tissues. Consequently the ill-effects of continued vomiting are prevented by the timely administration of sufficient fluid containing glucose and saline. In a severe adult case it is estimated that about eight pints—four pints of 5 per cent glucose and four of normal isotonic saline, should be given intravenously within twenty-four hours.

Treatment of Special Cases of Vomiting

In operations on the stomach vomiting is treated by withholding fluids by mouth and substituting an intravenous drip, giving four to five pints of glucose and two pints of normal saline in the twenty-four hours. After it has ceased, fluids by mouth are increased gradually starting with small amounts, and if retained the intravenous drip is discontinued.

Vicious vomiting after gastro-enterostomy is bile-stained, alkaline, and persistent, and is due to oedema or kinking of the efferent loop of small intestine. It should be treated at first as for paralytic ileus, for which it may be mistaken, fluids by mouth being withheld, the stomach washed out, and an intravenous drip started. The vomitus does not become brown, and if there is no severe epigastric pain and collapse such as occurs in obstruction, a diagnosis of vicious vomiting can be made and operation undertaken for its relief.

Haematemesis

The vomiting of small quantities of blood is not uncommon after gastric operations. It may be vomited in large quantities after being swallowed, especially after fractures of the base of the skull. But when large in amount and accompanied by signs of gastric haemorrhage, such as pallor, restlessness, sighing respiration, and a rising pulse rate, fluids by mouth must be withheld and morphia given. Blood transfusion replaces not only fluids lost, but promotes clotting. Occasionally removal of a clot by washing out the stomach by means of a Ryle's tube will allay the vomiting. If the bleeding and vomiting are progressive, laparotomy must be undertaken to ligature the bleeding point.

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SURGICAL CAUSES OF CONSTIPATION

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Among the many disorders to which the flesh is heir it would be difficult to find one so prevalent, so productive in complications, and so far-reaching in its effects as constipation. The scope of this article is to discuss the subject from its surgical aspect, keeping in mind that constipation may be reflex from almost any other organ in the abdomen, as well as direct from conditions outside, in the wall, or in the lumen of the large bowel.

Recent obituary notices in the *B.M.J.* and the *P.-G.M.J.* bring to our mind the bygone controversies of Lane's disease and the supposed effects of colon stasis. Twenty years ago it was enough to think of the diagnosis of chronic intestinal stasis in order to make it. A French textbook of that period graphically describes the chronics who swarm the consulting rooms suffering from "the great disease" from which proceeds more than half pathology. "The

specialists in gastric disease treat them for ulcer or enteritis; the gynaecologists for salpingitis, cystic ovary and dysmenorrhoea; the urologists for movable kidney and bacteruria; the orthopaedists for scoliosis or flat foot; the laryngologists remove their tonsils, adenoids, or nasal septum; the dermatologists treat them for pruritis; the dentists treat them for pyorrhoea; the truss-makers try all sorts of belts, corsets and pads; the neurologists are consulted for headache, insomnia and irritability, while the vaccino-therapists find a field almost too large for description. We find these sufferers back again at the thermal stations; at Vichy for their liver; at Luxeuil for their utero-ovarian symptoms; at Plombières for constipation; at Aix for arthralgias and rheumatism; at Evian for renal insufficiency; at Divonne they take the baths and are massaged, and in Switzerland they swarm in the sanatoria where they try to get fat."

From there we are led on to a consideration of the kinks and bands of the intestine, and after the failure of medical treatment, to that morass of surgical disasters—division of bands, mobilisation of the colon, colocaecopexy, caecoplication, ileo-sigmoidostomy, and most miserable of all, complete colectomy with its mortality of only 3 per cent!

In modern society most people have their bowels opened once in 24 hours. To have the bowels opened once in 48 hours might be considered to be within the limits of normal, but beyond this constipation lies.

It is agreed that there are two great classes of constipation: (1) **Intestinal constipation**, in which the passage through the intestines is delayed whilst defaecation is normal, and (2) **pelvi-rectal constipation** or dyschezia, in which there is no delay in the arrival of the faeces in the pelvic colon, but their final excretion is not performed adequately.

CLINICAL METHODS

History of the Case (amanuensis)

The importance of careful interrogation of the patient cannot be over emphasised. The surgeon should take the history himself, allowing the patient to describe his symptoms his own way, but guiding his talk into relevant channels. Sometimes on this alone a diagnosis can be arrived at, and confirmed by subsequent investigations.

Physical Examination

Mistakes are more frequently made by incomplete examination than by lack of knowledge. The whole body should be taken into account. Constipation can be due to reflex inhibitions from such conditions as disease in the appendix, the stomach or the gall-bladder, as well as from a painful fissure-in-ano or genito-urinary affections. Great attention should be paid to the appearance of the abdomen—which should be viewed from the side as well as from the end of the bed. Generalised or localised distension, visible peristalsis, and abnormal swellings can then be detected. It is also advisable to get the patient to stand, and so estimate the tone and posture of the abdominal wall.

Palpation, percussion, and auscultation will supplement these findings. With the stethoscope placed over various areas stenosis noises can sometimes be heard which could not be felt by the hand.

A rectal and a bimanual examination should always be made.

Radiological Examination

Depending on the severity of the case, a direct X-ray, a bismuth meal watch-through, and a barium enema should be carried out. It is well recognised that even an experienced radiologist can fail to demonstrate a large intestine stricture, although the stricture is on the verge of acute obstruction. If the history of the case warrants it, laparotomy should not wait on X-ray confirmation.

The Proctoscope and the Sigmoidoscope are essential instruments.

Laboratory Investigation

The faeces, the urine, the blood, and sometimes the C.S.F. will require analysis. Particular attention should be paid to the presence of occult blood in the stools.

The presence of organic nervous diseases such as tabes dorsalis, myelitis, or meningitis

may be cleared up in this way. When dysuria and constipation appear simultaneously, even if no other symptoms are present, organic nervous disease should be suspected.

DIAGNOSIS

Looked at from a surgical point of view certain organic lesions stand out in practical importance from the rest.

CARCINOMA OF THE COLON

When a patient above the age of forty complains of constipation of increasing severity, where it has never existed before, it is carcinoma of the pelvic colon unless it can be proved to the contrary. Purgatives and enemata begin to lose their effect, diarrhoea sometimes alternates with constipation, and attacks of colic appear, aggravated by laxatives, but not becoming really severe until acute obstruction is imminent. The colic is accompanied by visible and palpable peristalsis; loud borborigmi are heard, and a peripheral distension of the abdomen is seen. It is interesting to note that visible peristalsis is not found in lead colic or colitis.

It is not always possible to feel a localised swelling owing to the distension, but sometimes an accumulation of faeces above the stricture may be detected, or a palpable lump may become evident by the presence of adherent omentum or loop of bowel. A finger in the rectum will frequently encounter ballooning, especially when the stricture is low down in the colon.

Loss of weight, anorexia, ascites and faecal vomiting are late symptoms, and the diagnosis should be made long before such conditions arise.

When the growth is in the caecum, flatulent distension and exaggerated peristalsis of the coils of the ileum may be detected, but it is not always easy to palpate the tumour as might be expected. Anaemia is more pronounced, and in some cases this is the only symptom. Occult blood can be demonstrated in the stools, and if repeated blood transfusions are given for the anaemia the haemoglobin rapidly falls again. Such cases can elude diagnosis until laparotomy is done, when it will be found that the caecum has been protected from palpation by the brim of the pelvis.

When the growth is in the transverse colon a rounded movable lump may be felt, and the distension is mainly in the right flank, but towards the hepatic and the splenic flexures the growth is hidden by the costal margins.

Treatment.—The treatment of malignant growths in the caecum, the ascending colon or the hepatic flexure is most satisfactory in its end results, and surprisingly easy in its performance. Owing to the distribution of the blood supply through the right colic artery, these three sites are treated by a similar procedure. The abdomen having been opened through a right paramedian incision, the peritoneum on the outer aspect of the bowel is divided. Caecum, ascending colon and hepatic flexure are mobilised, and thrown over to the left so as to expose the right colic artery and the lymphatics associated with it. The artery is divided between ligatures close to its origin, and the rent in the inner leaf of the meso-colon is extended upwards to a point beyond the hepatic flexure where the blood supply from the mid-colic artery takes over, and downwards to a point on the ileum about 6 inches proximal to the ileo-caecal valve. Clamps are placed on the ileum and on the transverse colon, and the whole of the intervening bowel with its glands and mesentery so mobilised is taken away. Lateral or end-to-end anastomosis can then be performed, and the adjacent incisions in the mesentery sewn together without tension.

Growths in the transverse colon, the splenic flexure and the descending colon are dealt with more simply, merely by removing that portion of the bowel containing the growth, together with 2 inches or so of healthy bowel above and below, and a wedge of mesentery containing the lymphatic glands.

When it is a question of the pelvic colon, the mortality after resection is high owing to the more solid character of the motions and the probability of leakage. It was for this reason that Paul of Liverpool invented his exteriorization method which was later to be popularised on the Continent and in America by Von Mikulitz. Here, after the bowel has been mobilised by division of peritoneum on its outer aspect, a loop containing the growth is brought out of the abdominal incision on the left, the adjacent sides of the bowel are sewn together "like the barrels of a double-barrelled shot gun," Paul's tubes are inserted, and the loop containing the

growth is removed. Ten days later the spur between the two loops of bowel is crushed with an enterotribe, and continuity is re-established. This procedure is particularly useful if distension is present, but it means a three-stage operation, and consequently some surgeons prefer to perform a transverse colostomy to divert the whole of the intestinal contents, then perform an ordinary resection, and at a later stage close the colostomy.

These growths of the bowel are relatively so benign that even if they are adherent to coils of small intestine, to the stomach, or even to the liver, they should be resected, but if resection is considered out of the question, then an anastomosis above and below the growth should be done in order to short-circuit the intestinal contents, postpone the advent of obstruction, and obviate a colostomy.

In the presence of distension, no attempt should be made to perform primary anastomosis, but a preliminary colostomy must be done in order to decompress the bowel. After an interval of about a fortnight, when the bowel has returned to normal, resection may be done.

REDUNDANT COLON

This condition is found in middle-aged patients of either sex, and closely simulates carcinoma coli in almost every clinical sign and symptom, and it may pass on to "acute on chronic" obstruction. An enema followed by another in four hours will usually give a good evacuation of the bowels, and allow time for further investigation, particularly a barium enema, which frequently demonstrates a very long and redundant splenic flexure or a looped-up sigmoid colon. Such a condition gives full play to speculation on the treatment of loops and bands, both congenital and acquired.

DIVERTICULITIS AND DIVERTICULOSIS

Sacculations in the colon may be present without giving rise to symptoms, and are frequently found in routine examinations. If, however, inflammatory changes take place in them, symptoms of chronic intestinal obstruction arise. Sometimes a large tender fixed mass, the size of a child's head, may be felt in the left iliac fossa. Bimanually it may be palpated as it pushes down towards the rectum. Later on peri-colic abscesses may form, or a fistula between bowel and bladder may arise. The patient will complain that he passes wind with his water, and intestinal contents may be demonstrated in the urine.

The symptoms, apart from those of peri-colic abscess—"the left-sided appendicitis"—are very similar to those of carcinoma, but the mass is larger, is tender on palpation, and shows a longer and more irregular outline with a barium enema. Frequently mucus is passed, and the patient looks ill and wasted.

I have found that the most satisfactory line of treatment is to perform a transverse colostomy, diverting the whole of the colonic contents, and to leave the colostomy acting for some twelve months. In favourable cases the swelling rapidly subsides, and gradually the lumen of the bowel re-establishes itself. It may then be considered whether it will be safe merely to close the colostomy, or whether the more formidable course of resection of the affected bowel may be undertaken. In a number of cases the disease slowly progresses to a fatal termination.

ILEO-CAECAL TUBERCULOSIS

The hyperplastic form of intestinal tuberculosis is almost always confined to the caecum. It differs from the ulcerative form in that the lesion is not destructive, but decreases the bulk of the caecum and encroaches on its lumen.

Clinical symptoms are insidious in their onset; irregular indigestion, discomfort in the right iliac fossa, and the passage of blood and mucus in the stools. Later on he suffers from griping pains and alternating constipation and diarrhoea. As the disease progresses a mass may be detected in the right iliac fossa, visible peristalsis may be seen, and borborigmi heard as the condition passes on to intestinal obstruction.

The differential diagnosis from carcinoma is the age of the patient, the length of the disease, and the intermission of the symptoms.

Occasionally tuberculosis and cancer are found together. **Actinomycosis** and **fibromatosis of the colon** are well-known conditions, but are indistinguishable clinically from cancer or tuberculosis, unless in the former the ray fungus is found in the pus.

ENTEROLITHS

This condition is occasionally met with in practice—and it is astonishing to see the size of the mass which can be passed without apparent damage to the anal canal. Recently a patient brought me one which just fitted into the mouth of a 1-lb. jam jar. She had passed two others before that, but she had thrown them away because she had not got a jam jar big enough to put them in!

Faecal concretions and accumulations may form masses varying in consistence from putty to stony hardness, and may fill the rectum and extend into the ascending and transverse portions of the colon. Considering the frequency of obstinate constipation it is surprising how seldom acute obstruction supervenes.

The pressure of the hardened masses on the mucous membrane leads to stercoral ulcers, and these in turn may rupture, leading to a very fatal form of peritonitis.

HIRSHPRUNG'S DISEASE

In his book on the integrative action of the nervous system, Sherrington pointed out the importance of postural tone, and explains how when one muscle contracts, its antagonist relaxes—the “reciprocal inhibition of antagonistic muscles.”

In this case the imbalance is due to increased sympathetic action on the sphincter muscle. The affected sphincter, whether it be at the recto-sigmoid junction or the internal sphincter of the anus, is tonically contracted while the wall of the colon proximal to the spasmodic stenosis undergoes hypertrophy and dilatation. The patient is usually a child, and the bowel may not act for months at a time, in spite of aperients. Abdominal distension may be enormous, and auto-intoxication manifests itself by the sallow complexion, the dry skin, and the dull mind.

It is interesting to note that in a barium meal watch-through the barium is seen to travel normally until the colon is reached, i.e. it is a dyschezia, and that with the barium enema no peristalsis or haustration of the colon is seen. Many other theories have been advanced, besides those of disordered neuro-muscular mechanism to account for this disease, but none of them are completely satisfactory, and consequently the problem of treatment has not yet been solved.

Complete excision of the colon at once suggests itself to the enterprising surgeon, and, indeed, in certain cases this has met with a measure of success, but it will not cure the condition if the rectum is involved as well. From the point of view of excision, most satisfactory are those cases in which the disease is localised to the pelvic colon. Here exteriorisation methods of the Paul-Mikulitz type are the safest and best.

Other observers have published cases in which division of Houston's valves in the rectum have been sufficient to effect a cure.

Lumbar sympathetic ganglionectomy has produced the best results up to now. More recently, however, it has been discovered that favourable and lasting results may be brought about by giving the patient a spinal anaesthetic.

Unfortunately, however, the lapse of time has shown that operations on the sympathetic are not lasting in their effect, and the neuro-muscular mechanism, like King Jeraboam, returns again to its evil ways.

Before any operation is performed, it is essential to get the colon empty. Copious enemas, oil by mouth and by rectum are needed, and the patient's general condition may be enormously improved by these measures alone.

Conclusions

Consideration has not been given in this article to such conditions as internal hernia, volvulus, intussusception, spastic ileus, mesenteric thrombosis, post-operative obstruction, and the like, because they come under the heading of the acute obstructions and require special measures for their diagnosis and treatment. Constipation may indeed be a transient prodromal symptom in these conditions, as may chronic constipation be a warning of an acute obstruction, and the picture alters accordingly.

Careful consideration of the whole patient, with the judicious use of every additional aid, is the only sure method of avoiding those pitfalls of abdominal surgery into which even the most experienced surgeon is liable to fall.